



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,157	11/20/2003	Jianhua Pan	CS23552RL	8997
20280	7590	01/10/2006	EXAMINER	
MOTOROLA INC 600 NORTH US HIGHWAY 45 ROOM AS437 LIBERTYVILLE, IL 60048-5343			SWERDLOW, DANIEL	
			ART UNIT	PAPER NUMBER
			2646	

DATE MAILED: 01/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/718,157

Applicant(s)

PAN, JIANHUA

Examiner

Daniel Swerdlow

Art Unit

2646

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 8-12 and 17-201 is/are rejected.
- 7) ☒ Claim(s) 4-7 and 13-16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1 through 3, 8, 9, 11, 12 and 17 through 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bourmeyster et al. (US Patent 5,680,393) in view of Yoshida et al. (US Patent 5,617,472).**

3. Regarding Claim 1, Bourmeyster discloses a method for suppressing background noise in combination with echo canceling (i.e., echo and noise control) in a hands-free mobile telephone (i.e., a communication device) (column 1, lines 8-12) comprising: receiving a voice signal at a microphone (i.e., an input to the communication device) (Fig. 3, reference 2, s(t); column 7, lines 3-6); and performing noise suppression (Fig. 3, reference 14; column 7, lines 8-10) and echo cancellation (Fig. 3, reference 30, 31; column 7, lines 2-3). Therefore, Bourmeyster anticipates all elements of Claim 1 except determining order of noise suppression and echo canceling based on background noise in the signal. Yoshida discloses noise suppression based on background noise level determination (Fig. 5, steps S503-S508; column 2, lines 8-11). Yoshida further discloses that such an arrangement improves articulation and conserves battery power (column 6, lines 50-61). It would have been obvious to one skilled in the art at the time of the invention to apply noise suppression based on background noise level determination as taught by Yoshida to the method taught by Bourmeyster for the purpose of realizing the aforesaid advantages.

Art Unit: 2646

Because the combination adaptively switches between echo cancellation only (in a low noise condition) and echo cancellation with noise suppression (in higher noise condition), the order of noise suppression and echo cancellation is determined based the background noise in the signal.

4. Regarding Claim 2, Yoshida further discloses comparing the noise level with a threshold and performing noise suppression when the background noise exceeds the threshold. Because the embodiment in Bourmeyster (i.e., Fig. 3) teaches noise suppression before echo cancellation, the combination performs noise suppression prior to echo cancellation when the noise level is above the threshold. Further, because the combination performs echo cancellation by itself when the noise level is below the threshold and noise suppression when the noise level is above the threshold, the combination performs echo cancellation prior to noise suppression when the noise level is below the threshold.

5. Regarding Claim 3, Yoshida further discloses determining noise level when a recurrence detector determines the microphone input is a noise signal (i.e., when no desired input is received) (column 3, lines 45-50).

6. Regarding Claim 8, Yoshida further discloses a noise level determination signal (Fig. 3, reference D2; column 3, lines 62-67) that corresponds to the indicator claimed.

7. Regarding Claim 9, Bourmeyster discloses a hands-free mobile telephone (i.e., an electronic device) (column 1, lines 8-12) comprising: a microphone (Fig. 3, reference 2, $s(t)$; column 7, lines 3-6) that corresponds to the audio input claimed; a loudspeaker (Fig. 3, reference 4, $r(t)$; column 7, lines 6-7); an inherent transceiver; a noise suppressor (Fig. 3, reference 14; column 7, lines 8-10) and an echo canceller (Fig. 3, reference 30, 31; column 7, lines 2-3) that correspond to the adaptive echo and noise control system claimed and inherently sends the

Art Unit: 2646

desired signal to the transceiver. Therefore, Bourmeyster anticipates all elements of Claim 1 except determining order of noise suppression and echo canceling based on noise in the received signal. Yoshida discloses noise suppression based on background noise level determination (Fig. 5, steps S503-S508; column 2, lines 8-11). Yoshida further discloses that such an arrangement improves articulation and conserves battery power (column 6, lines 50-61). It would have been obvious to one skilled in the art at the time of the invention to apply noise suppression based on background noise level determination as taught by Yoshida to the method taught by Bourmeyster for the purpose of realizing the aforesaid advantages.

8. Regarding Claim 11, Bourmeyster further discloses the noise suppressor comprising: an energy component device (Fig. 1, reference 10; column 5, lines 34-38) that corresponds to the frequency domain converter claimed and extracts energy components for frequency bands; an SNR estimator (Fig. 1, reference 11; column 5, lines 50-59) that corresponds to the noise estimator claimed and estimates a signal to noise ratio; a gain calculator (Fig. 1, reference 12; column 6, lines 26-33) that corresponds to the adaptive noise suppression controller claimed and calculates gains for noise suppression components; a synthesis circuit (Fig. 1, reference 13; column 6, lines 35-40) that corresponds to the time domain converter claimed and performs an inverse Fourier transform; and time domain filter (Fig. 1, reference 14; column 6, lines 41-50) that corresponds to the multi-channel noise suppression claimed and produces the noise suppressed voice signal.

9. Regarding Claim 12, Yoshida further discloses comparing the noise level with a threshold and performing noise suppression when the background noise exceeds the threshold. Because the embodiment in Bourmeyster (i.e., Fig. 3) teaches noise suppression before echo

cancellation, the combination performs noise suppression prior to echo cancellation when the noise level is above the threshold. Further, because the combination performs echo cancellation by itself when the noise level is below the threshold and noise suppression when the noise level is above the threshold, the combination performs echo cancellation prior to noise suppression when the noise level is below the threshold.

10. Regarding Claim 17, Yoshida further discloses a noise level determination signal (Fig. 3, reference D2; column 3, lines 62-67) that corresponds to the indicator claimed.

11. Regarding Claim 18, Yoshida further discloses determining noise level when a recurrence detector determines the microphone input is a noise signal (i.e., when no desired input is received) (column 3, lines 45-50).

12. Regarding Claim 19, Bourmeyster discloses a method for suppressing background noise in combination with echo canceling in a hands-free mobile telephone (i.e., a communication device) (column 1, lines 8-12) comprising: receiving a signal at a microphone (i.e., an acoustic signal at an input to the communication device) (Fig. 3, reference 2, $s(t)$; column 7, lines 3-6) including a noisy voice signal (i.e., a speech component and a noise component) and an echo signal (i.e., an echo component) (column 7, lines 3-6); performing noise suppression (Fig. 3, reference 14; column 7, lines 8-10) and echo cancellation (Fig. 3, reference 30, 31; column 7, lines 2-3); and producing and transmitting a difference signal that corresponds to the desired signal claimed (column 7, lines 36-39). Therefore, Bourmeyster anticipates all elements of Claim 19 except obtaining the noise component and determining order of noise suppression and echo canceling based on background noise in the signal. Yoshida discloses noise suppression based on background noise level determination (Fig. 5, steps S503-S508; column 2, lines 8-11) and

subtraction of a noise component (column 4, lines 5-59), which inherently includes obtaining the noise component. Yoshida further discloses that such an arrangement improves articulation and conserves battery power (column 6, lines 50-61). It would have been obvious to one skilled in the art at the time of the invention to apply noise suppression based on background noise level determination as taught by Yoshida to the method taught by Bourmeyster for the purpose of realizing the aforesaid advantages. Because the combination adaptively switches between echo cancellation only (in a low noise condition) and echo cancellation with noise suppression (in higher noise condition), the order of noise suppression and echo cancellation is determined based on the background noise in the signal. Yoshida further discloses comparing the noise level with a threshold and performing noise suppression when the background noise exceeds the threshold. Because the embodiment in Bourmeyster (i.e., Fig. 3) teaches noise suppression before echo cancellation, the combination performs noise suppression prior to echo cancellation when the noise level is above the threshold. Further, because the combination performs echo cancellation by itself when the noise level is below the threshold and noise suppression when the noise level is above the threshold, the combination performs echo cancellation prior to noise suppression when the noise level is below the threshold.

13. Regarding Claim 20, Yoshida further discloses determining noise level when a recurrence detector determines the microphone input is a noise signal (i.e., when no desired input is received) (column 3, lines 45-50).

14. **Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bourmeyster in view of Yoshida and further in view of Liu et al. (US Patent 6,108,412).**

Art Unit: 2646

15. Regarding Claim 10, Bourmeyster further discloses the echo canceller comprising a subtractor (Fig. 3, reference 30; column 7, lines 2-3) that corresponds to the cancellation point claimed. Therefore, the combination makes obvious all elements except an adaptive filter, a least mean squares adaptation control and a doubletalk detector. Liu discloses an echo canceller comprising an adaptive filter, a normalized-LMS calculator and a doubletalk detector (Fig. 3, reference 300, 320, 330, 340; column 6, lines 16-19). Liu further discloses that such an arrangement provides convergence to minimal error condition and maximum removal of signal corruption (column 2, lines 41-45). It would have been obvious to one skilled in the art at the time of the invention to apply an adaptive filter, a normalized-LMS calculator and a doubletalk detector as taught by Liu to the method combination made obvious by Bourmeyster and Yoshida for the purpose of realizing the aforesaid advantages.

Allowable Subject Matter

16. **Claims 4 through 7 and 13 through 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.**

17. Claims 4 through 7 and 13 through 16 are allowable matter for reasons stated in the prior Office action.

Response to Arguments

18. **Applicant's arguments filed 14 October 2005 have been fully considered but they are not persuasive.**

19. Applicant's arguments, directed to each independent Claims 1, 9 and 19 in turn repeatedly allege that the combination of Bourmeyster and Yoshida fails to make obvious a method including "adaptively determining an order of noise suppression and echo cancellation based on the background noise in the signal" as claimed in Claim 1, a device "configured to adaptively determine an order of echo cancellation and noise suppression based on an amount of noise in the received signal" as claimed in Claim 9, or a method including "configuring the order of echo cancellation and noise suppression to perform echo cancellation prior to noise suppression on the acoustic signal if the noise component is below at least one threshold to obtain a desired signal; configuring the order of echo cancellation and noise suppression to perform noise suppression prior to echo cancellation on the acoustic signal if the noise component is above the at least one threshold To obtain a desired signal" as claimed in Claim 19. Examiner respectfully disagrees. The embodiment relied upon in Bourmeyster is the embodiment of Fig. 3. This embodiment discloses a combined echo canceller and noise suppressor that performs noise suppression on a microphone signal $s(t)+e(t)$ to produce a noise-suppressed microphone signal $s^*(nT)=e^*(nT)$ and subsequently performs echo cancellation on the noise suppressed signal. Yoshida discloses a controlled noise canceller that operates on an acoustic signal when a determined noise level exceeds a threshold. As such, the combination makes obvious a method and a device wherein noise suppression is performed on a microphone signal $s(t)+e(t)$ to produce a noise-suppressed microphone signal $s^*(nT)=e^*(nT)$ and echo cancellation is subsequently performed on the noise suppressed signal when a noise level is above a threshold and echo cancellation is performed directly on the microphone signal when the noise level is below the threshold. The word order has several distinct meanings including

“arrangement or sequence of events in time”, “degree” or “command”. Because the combination of Bourmeyster and Yoshida controls the noise suppression function, it inherently produces a “command”. Further, because the combination of Bourmeyster and Yoshida turns the noise suppression function on and off, it inherently determines a “degree”. In addition, even the “arrangement or sequence of events in time” interpretation does not limit the claim to determining whether to either perform noise suppression on the signal and subsequently perform echo cancellation on the noise-suppressed signal or perform echo cancellation on the signal and subsequently perform noise suppression on the echo-canceled signal since it could just as well apply to performing echo cancellation alone during a first time period and noise suppression, either with or without echo cancellation during a second time period. Since the combination of Bourmeyster and Yoshida performs echo cancellation directly on the microphone signal when the noise level is below the threshold but performs noise suppression on a microphone signal to produce a noise-suppressed microphone signal and echo cancellation on the noise suppressed signal when a noise level is above a threshold, it meets this interpretation of the word “order” as well. Therefore, the combination makes obvious all elements of Claims 1 and 9.

20. Regarding Claim 19, the recitation “prior to” is similarly ambiguous in that it does not limit the claim to determining whether to either perform noise suppression on the signal and subsequently perform echo cancellation on the noise-suppressed signal or perform echo cancellation on the signal and subsequently perform noise suppression on the echo-canceled signal since it could just as well apply to performing echo cancellation alone during a first time period and noise suppression, either with or without echo cancellation during a second time period. Since the combination of Bourmeyster and Yoshida performs echo cancellation directly

Art Unit: 2646

on the microphone signal when the noise level is below the threshold but performs noise suppression on a microphone signal to produce a noise-suppressed microphone signal and echo cancellation on the noise suppressed signal when the noise level rises above the threshold, it meets this interpretation of the recitation "prior to". Therefore, the combination makes obvious all elements of Claim 19.

Conclusion

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Swerdlow whose telephone number is 571-272-7531. The examiner can normally be reached on Monday through Friday between 7:30 AM and 5:00 PM.

Art Unit: 2646

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh H. Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel Swerdlow
Examiner
Art Unit 2646

ds
6 January 2006